Rural Two Lane Case Study

SR 78 near Red Lodge
Montana DOT

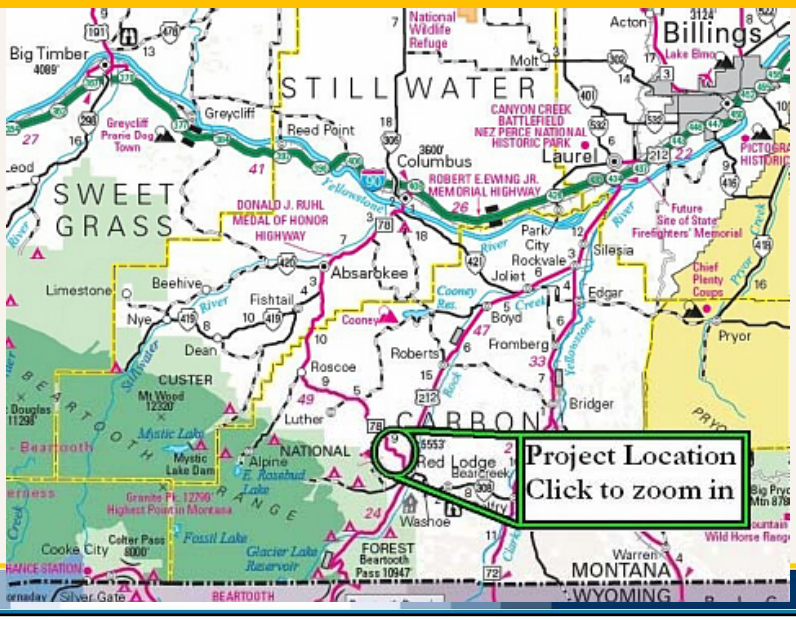
Learning Outcomes:

Apply the HSM to Montana Department of Transportation Projects

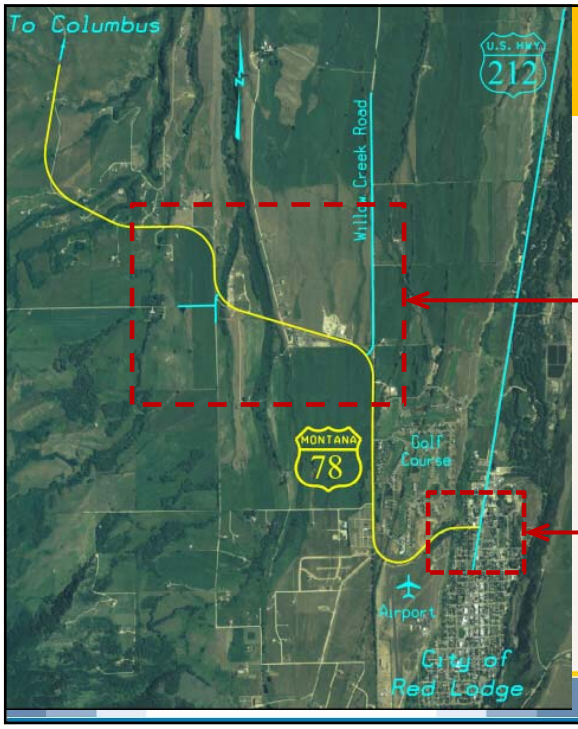
- Rural Two-Lane Intersection
- Rural Two-Lane Roadway Segments

10-2

Case Study Project: SR 78 near Red Lodge



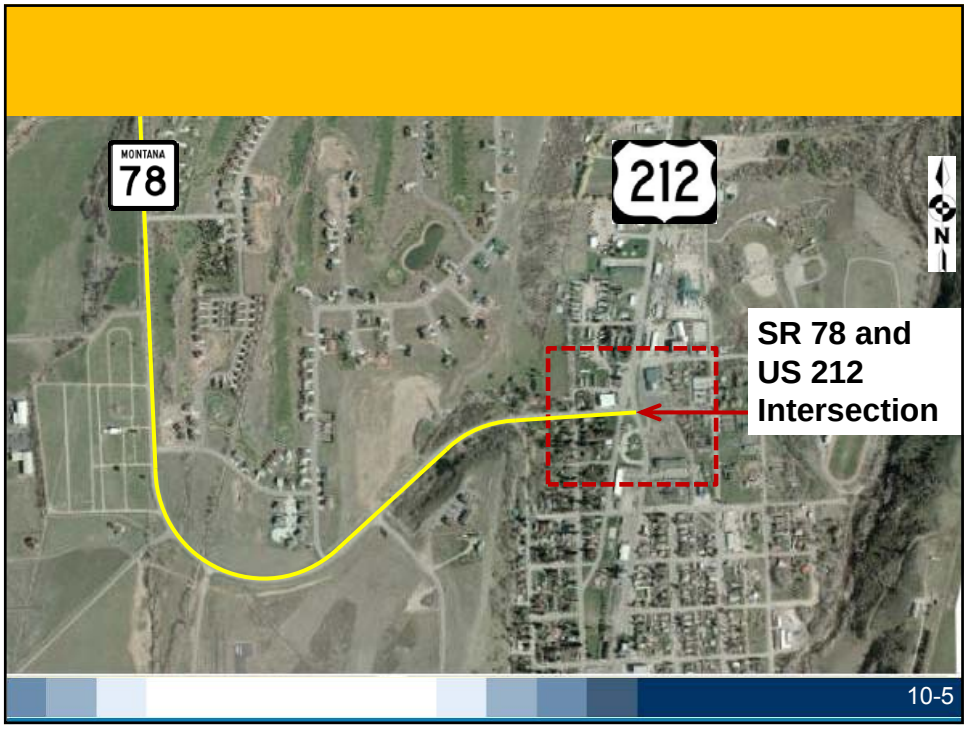
10-3

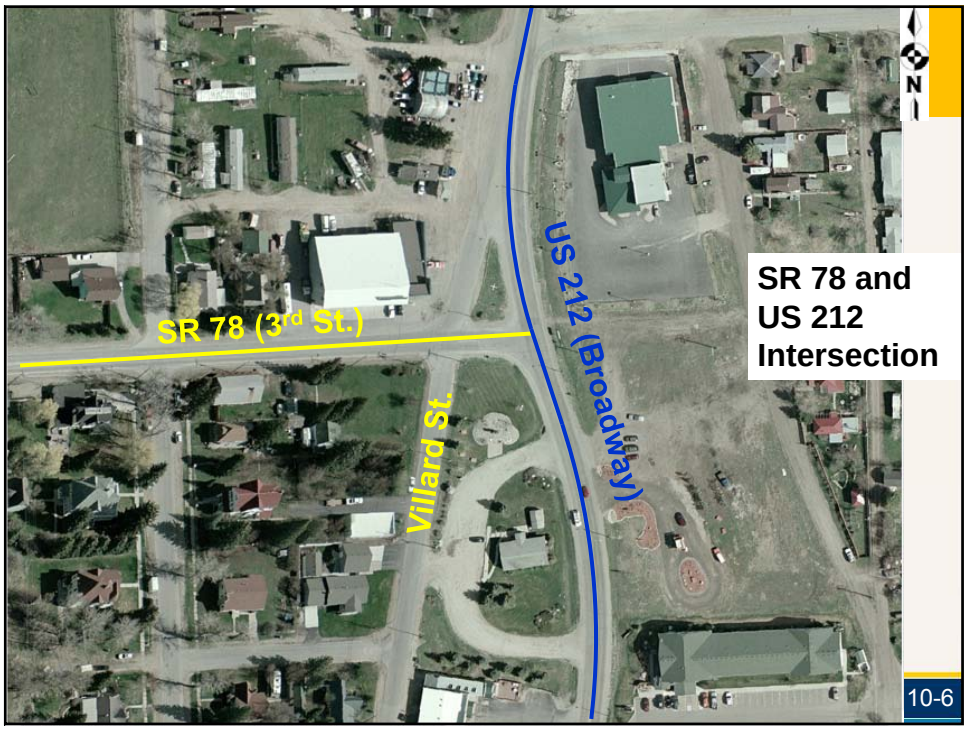


3 Curve Realignments

SR 78 and US 212 Intersection

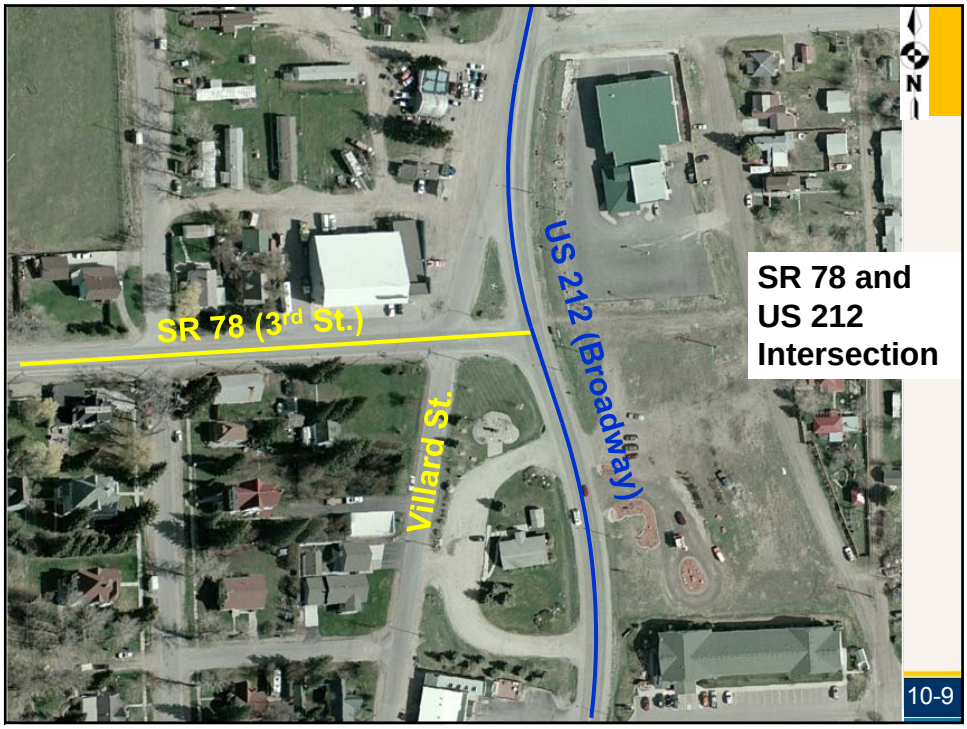
10-4


MONTANA
78
212
N
SR 78 and
US 212
Intersection
10-5

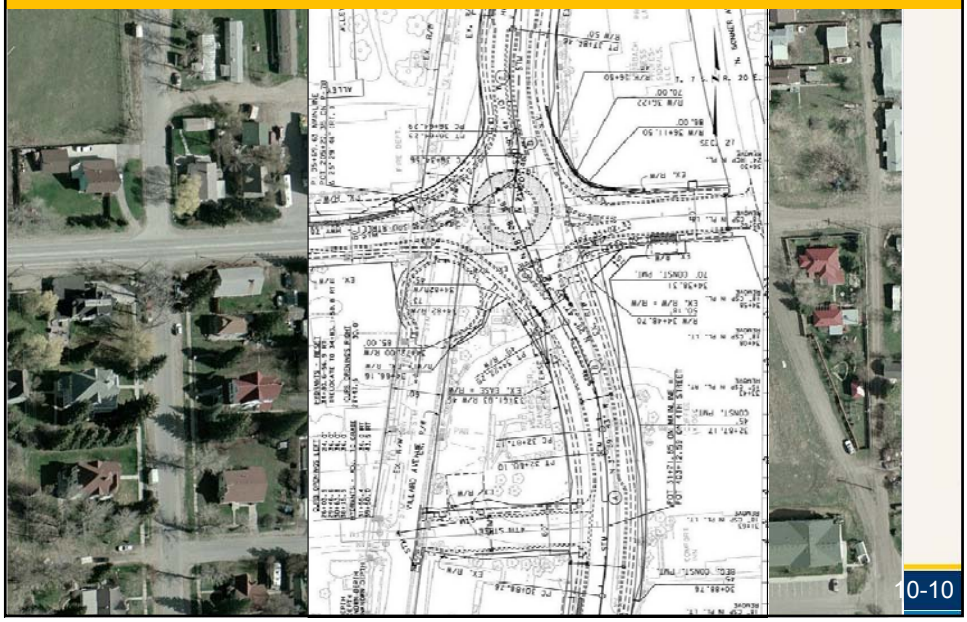

N
SR 78 (3rd St.)
US 212 (Broadway)
Villard St.
SR 78 and
US 212
Intersection
10-6

US 212 Approach to SR 52 Intersection

SR 78 Approach to US 212 Intersection



Proposed Roundabout Alternative



Using Excel Spreadsheets for Intersection Crash Frequency Prediction

Demonstration of Excel Spreadsheets

Group Exercise for HSM Crash Prediction

Alternatives Discussion

10-11

Intersection Data 2010 [2033]:

SR 78 and US 212 (3ST)

- AADT SR78 = ($AADT_{minor}$) = 3,750 [5,000]
- AADT 212 ($AADT_{major}$) = 7,125 [9,500]
- Skew = 15º

SR 78 and Villard St. (4ST)

- AADT SR78 = ($AADT_{major}$) = 3,750 [5,000]
- AADT Villard St. = ($AADT_{minor}$) = 1,125 [1,500]
- Skew = 15º

Assume: 1) Existing intersection configuration for 2033
2) SADT (Summer Peak) = 1.2 × *AADT*

10-12

Intersection Alternatives:

1. Left-turn lane on US 212 NB at SR 78
2. Right-turn lane on US 212 SB at SR 78
3. Left-turn lane on SR 78 EB at Villard St.
4. 2 Left turn lanes on SR 78 at Villard St.
5. Eliminate intersection skew (both)
6. Replace both intersections with a single modern roundabout (proposed)
7. Other alternatives?

10-13

HSM Crash Prediction Outcomes:

SR 78 and US 212 (3ST)

- $N_{predicted\text{-}2010}$ = (existing) [with alt. changes]
- $N_{predicted\text{-}2033}$ = (existing) [with alt. changes]

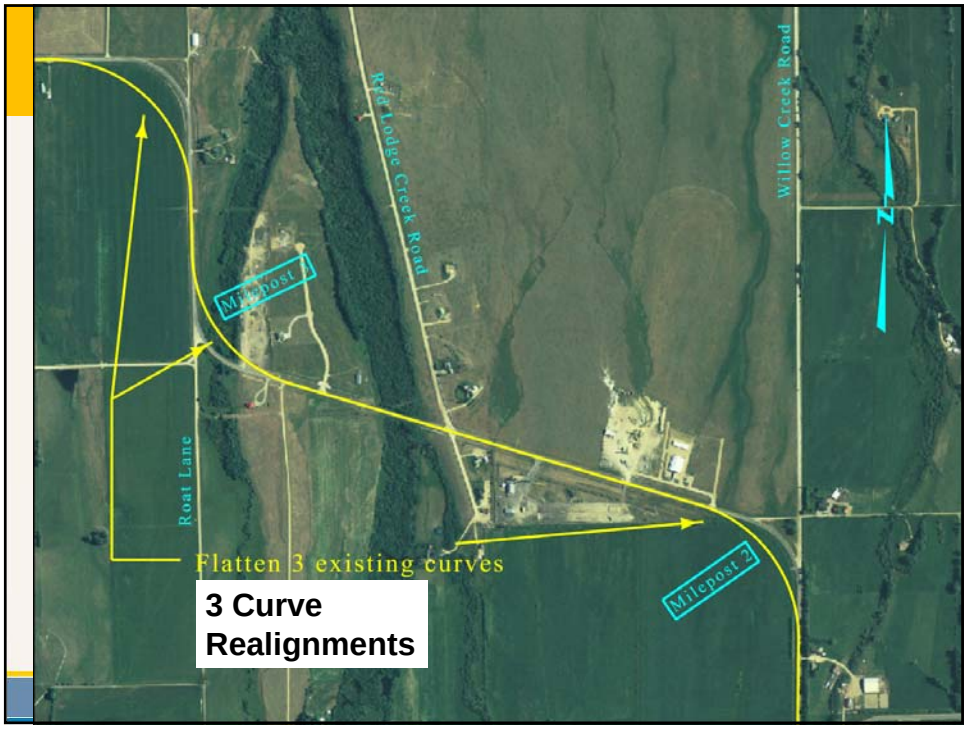
SR 78 and Villard St. (4ST)

- $N_{predicted\text{-}2010}$ = (existing) [with alt. changes]
- $N_{predicted\text{-}2033}$ = (existing) [with alt. changes]

SR 78 and US 212 (Roundabout)

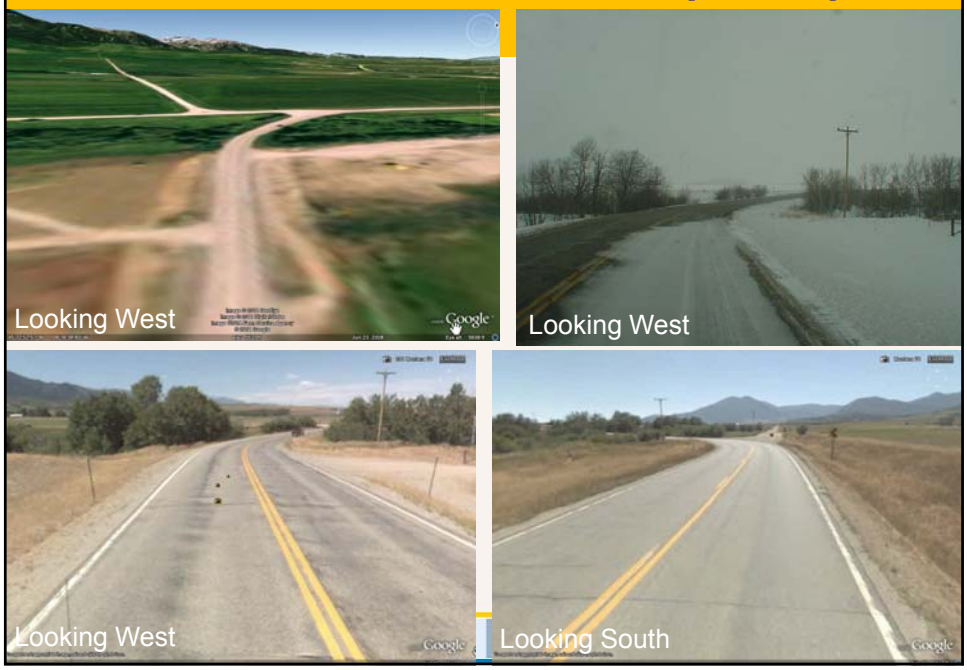
- $N_{predicted\text{-}2010}$ =
- $N_{predicted\text{-}2033}$ =

10-14


Red Lodge Creek Road
Willow Creek Road
Roat Lane
Flatten 3 existing curves
Milepost 2
Milepost 3
N
3 Curve Realignments

SR 78 Curve at Sta 114+00 (MP 2.1)

SR 78 Curve at Sta. 165+00 (MP 3.2)



SR 78 Curve at Sta. 187+00 (MP 3.6)

Using Excel Spreadsheets for Roadway Segments Crash Frequency Prediction

Demonstration of Excel Spreadsheets

Group Exercise for HSM Crash Prediction

Alternatives Discussion

10-20

SR 78 Roadway Segments Data [Proposed]:

SR 78 Station 85+00 to 205+00 [2.273 miles]

- AADT 2010 [2033] = 2,000 [4,000]
- Lane width = 12 ft [12 ft]
- Shoulder width = 1 ft gravel [2 or 4 ft paved]
- Existing Radii (ft) 1 = 604; 2 = 574; 3 = 574
  [1 = 1,700; 2 = 960; 3 = 960 (w/spirals)]
- Grades = ≤ 5% [≤ 4%]
- Driveway Density = 10 per mile
- RHR = 3 [2]
- No lighting or centerline rumble strips

10-21

SR 78 Section Crash Data, 2001 - 2010

Fatal = 0; Injury = 8 (11); PDO = 15; Total = 23

All SVROR; 16 on curves; 7 on tangents; Dir. = split

Weighted AADT = 1,629; Length = 2.273 mi

MVMT = 5.946; Crash Rate = 3.9; Severity = 35%

3 Semi-truck; 4 Motorcycle; 15 Car/Pickup/SUV

6 Nighttime; 17 Daylight/Dusk

6 Alcohol; 8 Ice/Snow; 1 Wet/Rain; 14 Dry (10 Dry + Daylight/Dusk + Curve)

18 Overturn; 5 Ditch/Fence/Rock

14 Male; 9 Female; 1 ≥ Age 65; 3 < Age 21

10-22

Roadway Alternatives:

1. 11 ft lane width (12 ft in curves)
2. 6 ft paved shoulder width
3. Minimum Radii = 1,200 ft (60 mph)
4. RHR = 1
5. Centerline and edgeline rumble strips
6. Highway lighting
7. Other alternatives?

10-23

HSM Crash Prediction Outcomes:

SR 78 (Station 85+00 to 205+00)

- $N_{predicted\text{-}2010}$ =
  - Existing
  - Proposed
  - With alternative changes
- $N_{predicted\text{-}2033}$ =
  - Existing
  - Proposed
  - With alternative changes

10-24

Learning Outcomes:

Apply the HSM to Montana Department of Transportation Projects

- Rural Two-Lane Intersection
- Rural Two-Lane Roadway Segments

10-25

Questions and Discussion

10-26